

Name:

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Solutions

1. Given an exponential function of the form $f(x) = a(b)^x$, circle the function below that cannot be an exponential function: Show work.

a. $f(x) = -2(0.9)^x$

b. $f(x) = 1\left(\frac{1}{3}\right)^x$

c. $f(x) = \frac{1}{8}(1.2)^x$

d. $f(x) = 5(-2)^x$

b can't be
negative
with Exponential
Functions

2. A zombie bacteria strain will double in size every 10 minutes. If a person is infected with 50 bacteria and it takes about 409,600 bacteria for a person to become a zombie, how long will it take for a person to mutate into a zombie? Write a formula to represent this. Show work.

$$f(x) = 50(2)^x \quad x = \# \text{ of 10-minute periods}$$

$$f(13) = 50(2)^{13} = 409,600$$

13 10-minute periods is equivalent to 130 minutes

3. Determine an equation for the exponential function $f(x) = a(b)^x$ with ordered pairs (0, 4) & (1, 12). Show work.

from (0, 4) we know $a = 4$ $f(x) = 4(b)^x$

because (0, 4) and (1, 12) have consecutive x values
we see that 4 is multiplied by 3 to get 12

$$b = 3 \quad f(x) = 4(3)^x \text{ or } f(x) = 4(3)^x$$

4. A radioactive isotope decays in such a way that after every 3,000 years has passed, there remains one-half of the isotope. If there are initially 5,376 grams of the isotope, then how many grams will be present after 33,000 years? Show work.

There are 11 3000-year periods in 33,000 years.

$$f(x) = 5376\left(\frac{1}{2}\right)^x \quad f(11) = 5376\left(\frac{1}{2}\right)^{11} = 2.625 \text{ grams}$$

5. Determine an equation for the exponential function $f(x) = a(b)^x$ with ordered pairs $(1, 9)$ & $(2, 54)$. Show work.

Since $(1, 9)$ & $(2, 54)$ have consecutive whole x values we know that 9 is multiplied by 6 to get 54
 $b = 6$ $f(x) = a(6)^x$ Now use $(1, 9)$ to get $9 = a(6)^1$ $9 = a \cdot 6$ $\frac{9}{6} = a$ $\frac{3}{2} = a$
 $f(x) = \frac{3}{2}(6)^x$

6. During a free fall, a skydiver falls 16 feet in the first second, 48 feet in the 2nd second, and 80 feet in the third second. If she continues to fall at this rate, how many feet will she fall during the 9th second? Show work.

Second	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th
	16	48	80	112	144	176	208	240	272

she falls 272 ft during the 9th second

7. Determine an equation for the exponential function $f(x) = a(b)^x$ with ordered pairs

$(1, 1000)$ & $(5, \frac{1}{10})$. Show work.

looks like we multiply by $\frac{1}{10}$ each time

x	0	1	2	3	4	5
y	10000	1000	100	10	1	$\frac{1}{10}$

$$f(x) = 10000\left(\frac{1}{10}\right)^x$$

8. A colony of bacteria began with 60. The population grows at a rate of 20% every 15 minutes. How many will there be in 4 hours? Show work.

$$f(x) = 60(1 + 20\%)^x = 60(1 + .20)^x = 60(1.2)^x$$

There are 16 15-minute periods in 4 hours

$$f(16) = 60(1.2)^{16} \approx 1,109.31 \approx 1,109 \text{ bacteria}$$

9. You invest \$1,500 in a compound interest bearing savings account with an annual interest rate of 8%. What is the future value of your investment in 10 years? Show work.

$$f(x) = 1500(1 + 8\%)^x = 1500(1.08)^x$$

$$f(10) = 1500(1.08)^{10} = 1500(1.08)^{10} \approx \$3,238.39$$

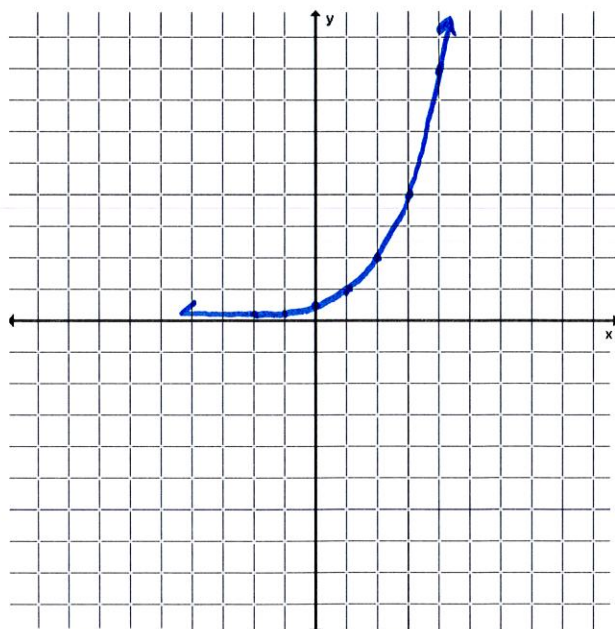
10. A table of values for an exponential function is shown. Fill in the missing y-values. Show work.

X	0	1	2	3	4	5	6
Y	3	9	27	81	243	729	

Looks like we multiply by 3 each time

$$f(x) = 3(3)^x$$

11. Carefully and neatly graph the exponential function $f(x) = \frac{1}{2}(2)^x$. Show work.



X	Y
-2	1/8
-1	1/4
0	1/2
1	1
2	2
3	4
4	8